

National Institutes of Health Clinical Center “There’s no other hospital like it!”



2008 DCRI IT Plan -



A large banner for Clinical Research Informatics. The top left corner features a red square logo with a white network diagram and the letters "C R I S" below it. The main text "Clinical Research Informatics" is in white on a blue gradient background. Below this is a white bar with the NIH Clinical Center logo and the text "NIH Clinical Center National Institutes of Health". The bottom portion of the banner is a dark blue/black image with a glowing blue DNA double helix, a glowing blue brain with circuitry, and a perspective grid of white lines.

Authors: Patricia Sengstack MS, RN-BC & Jon Walter McKeeby, D.Sc.

Message from the Clinical Center's Chief Information Officer

Over the last year, the Department of Clinical Research Informatics has been involved in numerous system implementations, upgrades and enhancements here at the Clinical Center. It's been an exciting year as we've watched so many of our users transition from older, less efficient processes to using enhanced clinical system functionality that supports NIH's core research mission. You'll see further on in this plan a list of the many projects completed over the last year. It's rewarding to see first-hand the value and reliance that people are beginning to place on our electronic systems as progress continues to be made.



The requests for system enhancements keep coming. It's rare that I attend a meeting or walk through the hallways where someone doesn't ask me if something can be done electronically. The ideas and creative innovations our users are requesting are excellent and we'll continue to work with multiple departments to assess feasibility and make it happen. Its user input and requests for changes that drive our work in DCRI.

With a very long "to do" list, as you can imagine, we find ourselves struggling with prioritizing the work on our plate. In attempts to provide focus and structure surrounding the work in DCRI, we have designated three key projects for the coming year as the cornerstone projects that other work will be scheduled around. These three cornerstone projects include the implementation of a new Pharmacy system, the Data Center Move and the upgrade to Sunrise Clinical Manager (SCM aka CRIS) version 5.0. All of our projects, identified to date, including these three, have been captured and are updated routinely in a way that we hope will help us maintain some semblance of control over the ever growing list of system enhancements and implementations.

We will continue to improve CRIS as well as the CITRIX access to a multitude of applications including CRIS and SoftMed ESA. For CRIS, we will continue the releases that occur every two weeks that add medications, tests, documentation, reports and other system enhancements. For CITRIX, we will provide access and printing enhancements to resolve the access and printing issues seen since September. In 2007, the number of updates made numbered 2,305 and included changes and enhancements made to the numerous systems maintained by DCRI.

Additionally, we plan to continue our outreach activities that we've put in place over the last year including routine unit rounds, a quarterly "CRIS Booth" for all CRIS users to visit and ask questions, as well as ongoing meetings with the various departments that utilize CRIS. These have proven to be invaluable in terms of developing relationships, understanding our customer's needs and providing them with the appropriate education.

Last year proved to be a tremendously busy year for our department and in looking ahead to 2008 and 2009, it appears that the trend will continue. We look forward to working with all of you as we begin another eventful year!

Jon W. McKeeby, CIO, Clinical Center

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DCRI Vision Statement

DCRI will serve as a model of collaborative excellence. We will lead through outstanding service for quality care and through innovation in the development, use, training, and evaluation of informatics for clinical research with the highest respect and value for privacy and confidentiality.

DCRI Mission Statement

The Department of Clinical Research Informatics (DCRI) is committed to delivering secure, responsive, high-quality, customer-oriented information technology services and support that foster clinical care and research.

Long Range Goals

1. **CRIS Development and Support** - Provide clinical systems that streamline workflow processes, enhance patient safety and allow user-friendly access to reliable data that assists in the transformation of data into information and knowledge.
2. **Technical Infrastructure** - Provide a secure, dependable technical environment that supports the increasing requirements that evolve with improving clinical and administrative systems.
3. **Customer Support (CRIS and Desktop)** - Improve customer satisfaction in the areas of clinical and technical support.

DCRI Guiding Principles

Guiding Principles are defined as a “broad philosophy” that guides an organization or department in all circumstances, irrespective of changes in its goals, strategies, type of work, or the top management. The concepts listed below are felt to embody the philosophy or principles that DCRI values as essential components in its day to day work.

Integrity

DCRI is in the business of providing a service; a service that supports the ultimate research mission at the NIH. As such, we have the privilege and responsibility of managing the very data used to make discoveries that can lead to the improved health of all people. The trust placed in our department to care for and manage this data is something that is not taken for granted. The integrity of each DCRI staff member reflects sound moral principle; uprightness, honesty, and sincerity. We adhere to the highest standards of accuracy and truth in serving our customers, users, contractors and DCRI staff.

Open Communication

Operating with a free flow of accurate and truthful information is essential to providing customer service and completing projects. Four keys to open communication that DCRI embraces are:

- Preserving the integrity of the process of communication.
- Respecting other’s point of view within the communication process.
- Being honest and accurate in all communications.
- Acting promptly to correct erroneous communications for which DCRI is responsible.

Patient and Employee Confidentiality

Clinical research requires appropriate protection of confidential and private information of both the patients, researchers and employees. With access to this information, DCRI must respect and adhere to the laws and regulations that govern our own access and use of the information. Additionally, we must ensure that access to the data contained within the various systems can be accessed only by those who have the need and the right to know. We do this via multiple physical and application security configurations that are in congruence with industry standards.

Expertise

We acquire and responsibly use specialized knowledge and experience. We value continuing education to keep our staff up to date on the latest technological advances and we routinely acquire knowledge related to the clinical systems that we manage. We believe it is essential to be respected experts in our field in order to build mutual understanding, credibility, and relationships among customers, users, contractors and DCRI staff.

DCRI Core Processes

1. CRIS Development and Support:

- Translate customer and organizational requirements into working components of our clinical information systems.
- Design systems that focus on the facilitation of clinical research workflow and seek opportunities to improve clinical processes while enhancing system functionality.

- Incorporate NIH, HHS, national data, decision support, and communication standards into system development to facilitate clinical care, system interoperability, and research.
- Support the translation of clinical research information needs into system requirements and support the functional testing of clinical applications to facilitate congruency with organizational work, user access and system design developments.
- Provide training and clinical support to system users, evaluate performance and effectiveness of system use, develop clinical research informatics training programs and foster collaboration to advance knowledge.
- Develop and facilitate curriculum for internal and external training programs/fellowships, plan improvement strategies for clinical operations, and direct system evaluation initiatives including prototype testing, performance measurements, and satisfaction surveys.

2. Technical Infrastructure:

- Maintain a high availability of critical computer and networking systems and to provide prompt, courteous technical support in a cost effective and timely manner.
- Provide comprehensive networking support that anticipates, meets, and exceeds our customer's service level agreements in a dynamic operational environment.
- Ensure computers, printers, and communication devices are available and managed effectively to support CC departments and NIH research.
- Support NIH clinical researchers and Clinical Center (CC) departments in achieving their goals by assisting them in all areas of software systems development, management and procurement.
- Develop, implement and maintain quality Clinical Applications that help promote patient care and research for the NIH.
- Provide for security and privacy for all sensitive information by ensuring the "Confidentiality, Integrity and Availability" for all clinical systems.
- Support and promote the goals of DCRI by seeking and engaging in active research and collaborative work within the NIH community as well as with academia and industry - work in which knowledge in the biomedical and computing sciences is advanced, and from which practical results that directly lead to better health care for everyone are realized.

3. Customer Support (CRIS and Desktop):

- Provide customer focused, quality IT services and technical support which assists our customers in making the best use of the newest biomedical technologies and existing information technologies in support of their business function.
- Support development and implementation of CRIS applications through integrated testing, delivery of instruction and facilitation of customer utilization of applications to support the workflow of clinical research studies and care.

2008 Annual Targets/Goals**CRIS Development and Support Targets:**

1. Complete the following system upgrades:
 - Upgrade of SCM (CRIS) to version 5.0
 - POIS 4.7 (Surgery system)
 - EKG system (TraceMaster)
 - Scheduling system
 - ANSOS
 - TeamTrack
 - SoftMed/3M applications for chart coding
 - Patient Recruitment & Volunteer system
2. Complete the following software application implementation projects:
 - ICU clinical documentation with Apache patient acuity monitoring
 - ICU customized “flowsheet” tab
 - Patient Discharge Information form
 - Web based Clinical Dashboard
 - POCT for OR – iSTAT
 - Epidemiology system
3. Complete planning and design for the following:
 - Barcoding system project
 - Images and links to images in CRIS
 - POIS II – Surgery system
4. Develop plan for migrating MS Access DTM databases to a more secure system
5. Complete the following interface development projects:
 - Crimson for outpatient documentation
 - StemLab to LIS
 - ProVation
 - ICU Device interfaces
 - Opus – Respiratory Care
 - Upgrade Lab interface to include improved orders management
6. Complete planning and design for the following interface development projects:
 - CDS for outpatient documentation
 - ProVation – GI results
 - NEI consult documentation
 - POCT results for Nursing/ICU
7. Initiate analysis for SCM 5.0 implementation
8. Complete Software development projects
 - DataMart
 - Sunrise Medication Manager – Pharmacy system
 - Prototype and Consent Writing
 - ATV II
9. Award contract for Barcoding project
10. Improve reporting for Occurrence Reporting system
11. Develop on-line prescriber training

Technical Infrastructure Targets:

1. Maintain strict adherence to Configuration Management and Release Management for all technical updates and changes to hardware and operating systems
2. Update disaster recovery plans and strategies
3. Update Firewall architecture to Cisco PIX
4. Complete remaining application migrations to Citrix Presentation 4
5. Implement Virtual Machines for improved server maintenance and monitoring
6. Initiate SCM 5.0 platform changes to support upgrade
7. Continue involvement in construction and design of data center space
8. Initiate planning for physical move of Data Center
9. CERC Planning, Procurement and Deployment
10. Support Clinic moves and opening of new units
11. Implement functionality to allow remote control of user's desktops
12. Administrative Software Development:
 - WTMS
 - Protocol Recruitment Management System
13. Maintain current level of technical support for all types of system hardware:
 - Server/Citrix maintenance
 - Network support
 - Desktop support
 - Interface maintenance
 - Firewall maintenance

Customer Support (CRIS and Desktop) Targets:

1. Conduct user satisfaction survey to identify opportunities for improvement in system or support
2. Continue unit rounds to assess CRIS satisfaction and/or CRIS issues
3. Meet routinely with all departments affected by and interfaced with CRIS
4. Use support center performance metrics to identify potential areas for improvement and/or user education (Aspect, Remedy, daily logs. etc.)
5. Complete enhancement to the SCD links web page to provide access to frequently used NIH resources and current literature
6. Enhance CRIS and DCRI websites based on feedback from users
7. Implement Team Track software for new pharmacy system
8. Extend user communication and preparedness for expected and unexpected system downtimes to institute users
9. Evaluate use of mobile technology for improved point of care documentation
10. Complete documentation of CRIS User Training Standard Operating Procedures
11. Maintain current level of support to CRIS users via:
 1. CRIS Support Center staff
 2. User Support Team staff

DCRI Cornerstone Projects for 2008

While the above projects are identified as target goals for the coming year, we have designated the following three projects to be the department's major focus. All other projects will need to work around these three in terms of timing and resources.

SMM Pharmacy (Sunrise Medication Manager)

Eclipsys' *SMM Pharmacy* is a pharmacy system that will be integrated into our current CRIS system. It will provide our pharmacy department with state of the art functionality that will bring patient medication management into a new era at the Clinical Center. Implementation of this system will have a significant impact on the medication preparation and delivery process. While our clinical CRIS users will not see a noticeable difference, the Pharmacy department will realize improvements in efficiency, safety, and processes. The project manager for this effort is Elizabeth McNamara. The estimated project completion date is in July of 2008 utilizing a phased approach. Phase I, which includes all unit dose medications, is scheduled for June 2008 with a Phase II implementation of all other medications including IV's slated for July 2008.

SCM 5.0 Upgrade (Sunrise Clinical Manager)

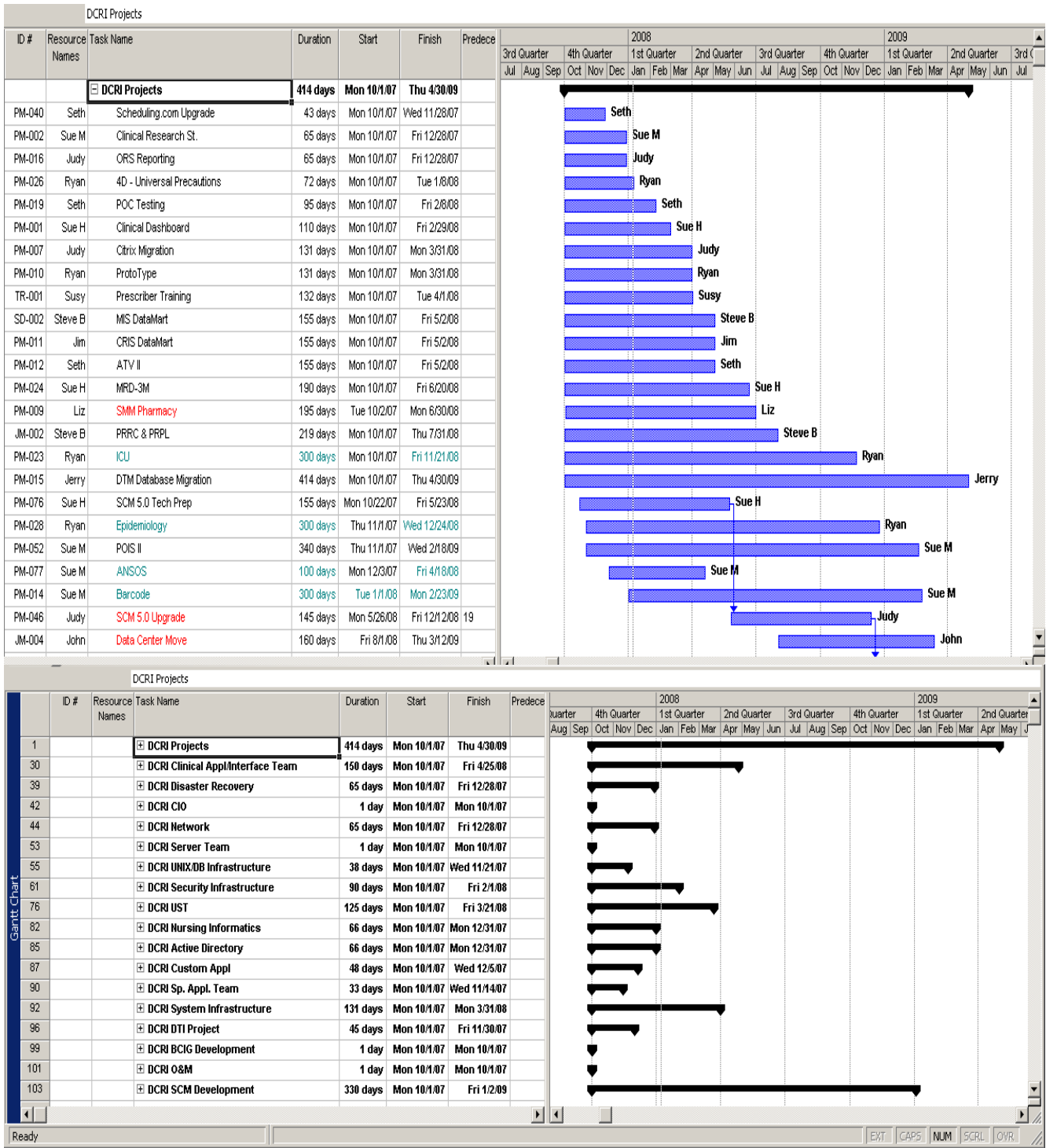
The upgrade to SCM (CRIS) version 5.0 is planned for December 2008. This implementation, managed by Judy Wight, will affect all CRIS users as there will be several enhancements to the system. In this new version, Eclipsys has provided it's customers with more technically efficient processes that will be "behind the scenes" as well as numerous improvements to clinical functionality for our patient care providers and researchers.

Data Center Move

Moving the servers and associated hardware that support all of our clinical applications here at the Clinical Center will be an extremely complex project. Over the course of the next year our team will be working to design the layout needed in the new site in the lower level of the CRC, and begin to plan the strategy to make the move. The space that the new center will occupy is scheduled to be ready by the end of 2008 with the actual move date estimated to be March/April 2009. The coordination of this effort must be exemplary across multiple disciplines and departments. The project managers for this effort are John Kocher and Judy Wight.

Project Tracking

The following chart represents many of the projects on DCRI's target list for 2008. Estimated timelines and lead resources are identified. The cornerstone projects can be noted in red font. Detailed tracking of projects utilizing MS Project as seen in the example below will provide a method to track and monitor progress of the various projects and initiatives planned for this year.



DCRI Future Projects

The projects listed below are planned for completion or initiation in 2009. Planning for some of these projects will begin in 2008:

- Barcoding system
- Datacenter move
- POIS Phase II
- Medication Reconciliation
- Interface with NHLBI - CDS
- HistoTrack interface – DTM
- Take Home Medication Management
- PYXIS and automation of medication dispensing
- CRIS Patient Portal
- Development of portal for clinical applications
- Single sign-on within the clinical portal
- Procure and install new hardware to support the above as needed

Assessment of Attainment of 2007 Targets

A review of DCRI's targets/goals for last year indicates successful completion of most targets. Below is a listing of the completed projects that were designated to be done in 2007.

CRIS Development and Support	Status
1. Streamline Configuration Management (CM) and maintain compliance with CM and release management processes.	Completed
2. Automate MRD forms	Completed
3. Enhance protocol attribution	Completed
4. Integrate Project Management methodologies into all DCRI projects.	Completed
5. Implement electronic prescriber clinical documentation – phase 1	Completed
6. Interface development projects- to bring outside systems into CRIS:	
• eSprit – Pain and Palliative Care documentation	Completed
• Viasys – Pulmonary function and exercise testing data	Completed
• ProVation – Upgrade	Completed
7. System Upgrades:	
• Sunrise Clinical Manager (CRIS)	Completed
• CBord (Nutrition)	Completed
• POIS 4.7 (Surgery system)	Completed (11/07)
8. Software development projects	
• Admissions Travel Voucher redesign – Phase 1	Completed
• Social Work Management System	Completed
• Rehab Management System	Completed
• Enhanced protocol attribution	Completed
9. Develop and implement to monitor drug levels in CRIS	Completed
10. Create interface to send Holter Monitor results to SoftMed → CRIS	Completed
11. Transition support of ProVation to DCRI	Completed
12. Maintain, support and monitor current systems to ensure a consistent, ongoing, stable environment.	Maintained and ongoing
13. Improve reporting for Occurrence Reporting system	Completed
14. Launch DCRI website	Completed
15. Complete notification server configuration to send emails upon posting of results in CRIS	Completed

Technical Infrastructure	Status
1. Maintain strict adherence to Configuration Management and Release Management for all technical updates and changes to hardware and operating systems	Maintained and ongoing
2. Successfully complete the CRIS Certification and Accreditation Security Review.	Completed (and ongoing)
3. Retire the mainframe computer	Completed
4. Update Firewall architecture to Cisco PIX	Completed
5. Install encryption software on all laptops	Completed
6. Upgrade Citrix to Presentation 4 (web-based)	Completed, Phase 1
7. Administrative Software Development - OFRM Payment Tracking	Completed
8. Maintain current level of technical support for all types of system hardware:	
• Server/Citrix maintenance	Maintained and ongoing
• Network support	Maintained and ongoing
• Desktop support	Maintained and ongoing
• Interface maintenance	Maintained and ongoing
• Firewall maintenance	Maintained and ongoing
Customer Support (CRIS and Desktop)	Status
1. Conduct user satisfaction surveys to identify opportunities for improvement.	Completed
2. Enhance relationships and communication infrastructure between DCRI and ancillary departments	Completed
3. Use support center performance metrics to identify potential areas for improvement and/or user education (Aspect, Remedy, daily logs. etc.)	Completed
4. Enhance CRIS and DCRI websites to make more user-friendly.	Completed
5. Implement Team Track software to streamline customer feedback and requests for improvements.	Completed
6. Improve user communication and preparedness for expected and unexpected system downtimes.	Completed
7. Enhance access for CRIS users to register for CRIS training classes on-line.	Completed
8. Maintain current level of support to CRIS users via:	
• CRIS Support Center staff	Maintained and ongoing
• User Support Team staff	Maintained and ongoing

Key IT Drivers and Influences for 2008

DCRI Customers

Institutes

The NIH is composed of 27 Institutes and Centers (ICs) whose research activities extend from basic research that explores the fundamental workings of biological systems and behavior, to studies that examine disease and treatments in clinical settings, to prevention, and to population-based analyses of health status needs. DCRI supports this work via computerized systems such as CRIS and its various components that allow institute staff to enter, retrieve and trend research data. A difficulty that often presents itself is that efforts to interface various IC systems is both time and resource intensive as well as confusing in terms of who controls the data.

Clinical Center Departments

CRIS is utilized by most departments in the Clinical Center. These include: Nursing and Patient Care Services, The Office of the Director, Critical Care Medicine, Medical Records, Imaging Services, Transfusion Medicine, Pharmacy, Ambulatory Care Services, Nuclear Medicine, Anesthesia and Surgical Services, Nutrition, Rehabilitation Services, Laboratory Medicine, Pain and Palliative Care,

OMS, Social Work, Spiritual Ministry, Medical Consult Service, and Pediatric Services. Many of these departments are broken into subspecialties creating additional unique customers. Managing interactions among so many departments presents an ongoing challenge. Each area presenting with unique needs and requests that must be coordinated, analyzed, designed, built, tested, taught, and implemented is at times a seemingly impossible task. The challenge posed to DCRI in the coming year will be centralizing the multitude of requests that come into the department and developing structure around the prioritization of those requests that is acceptable to our customers.

Review and Advisory Boards

Medical Executive Committee (MEC)

The Medical Executive Committee (MEC) advises the Clinical Center Director on clinical aspects of operations and develops policies governing standards of medical care in the Clinical Center. The group consists of Clinical Directors from each Institute and other senior clinical and administrative representatives. Directives and mandates from this group can influence our clinical systems and require refocusing DCRI's work based on identified needs.

Medical Executive Committee - Information Technology (MEC-IT)

The Medical Executive Committee - Information Technology (MEC-IT)

This subcommittee is a branch of the MEC whose focus is on the Clinical Center's IT needs. This group was created to assist DCRI in prioritizing work related to some of the more major projects that involve a high level of complexity, require a significant amount of DCRI resources, and careful planning and management in order to be successful.

Pharmacy and Therapeutics Committee

The Pharmacy and Therapeutics Committee meets monthly to review issues related to all aspects of medication management. Oftentimes situations arise that require data from the CRIS system or a request is made to determine if there is a technical solution to address an identified problem.

The Joint Commission

The Joint Commission (JC) evaluates and accredits nearly 16,000 health care organizations and programs in the United States. An independent, not-for-profit organization, the JC is the nation's predominant standards-setting and accrediting body in health care. Since 1951, the JC has maintained state-of-the-art standards that focus on improving the quality and safety of care provided by health care organizations. For example, standards are set for such areas as medical and nursing staff credentialing, fire and emergency responses, patient safety, and continuous improvement of the services provided for patients. DCRI is responsible for ensuring that the JC standards for Information Management are met. In addition, each year the JC publishes their National Patient Safety Goals. Many of these goals require the direct involvement of DCRI, whether it's to develop new functionality for our clinical systems or to provide data contained within the numerous databases that DCRI manages.

Clinical Fellows Committee/Clinical Fellows IT Advisory Group

Created in 2004 to serve as a communications venue for clinical fellows, this highly energized committee meets quarterly with Dr. Gallin. Membership includes clinical fellows representing all Institutes. In 2007, a subgroup was formed (Clinical Fellows IT Advisory Group) that meets monthly to address CRIS/IT issues. We anticipate that issues will arise at these meetings that will require DCRI to provide information and/or analysis for issue resolution options.

CRIS Steering Committee/CRIS II

The CRIS Steering Committee provides planning and budgetary oversight for the overall CRIS initiative. This group is represented by directors and administration from multiple institutes and centers and has provided, and still provides direction for the overall CRIS project. They are currently involved in discussions related to CRIS II whose focus is the development of a data warehouse that will contain research from multiple systems.

Nursing Information Systems Committee (NIS)

The Nursing Information Systems Committee (NIS) meets monthly and consists of nursing representatives from all departments in the Clinical Center. They discuss issues related to CRIS and brainstorm solutions for improvement. This forum is also where nursing related system changes are brought forward for review, feedback and approval by the group prior to moving forward with more in depth analysis. Additionally, this meeting is a time of sharing and learning for these CRIS superusers. Members from DCRI's configuration team attend these meetings to listen to issues and provide information as required.

System Solution Partners

This group is comprised of representatives from each of the clinical systems that interface with CRIS (DLM, DTM, Radiology, Nutrition, etc.) as well as some key users (i.e. – nursing). This is a fairly technical group who meet monthly to communicate issues that may affect all systems. This forum has also been educational, as the various ancillary systems have made presentations to the group so that everyone has a better appreciation for how each system works and potentially impacts the others.

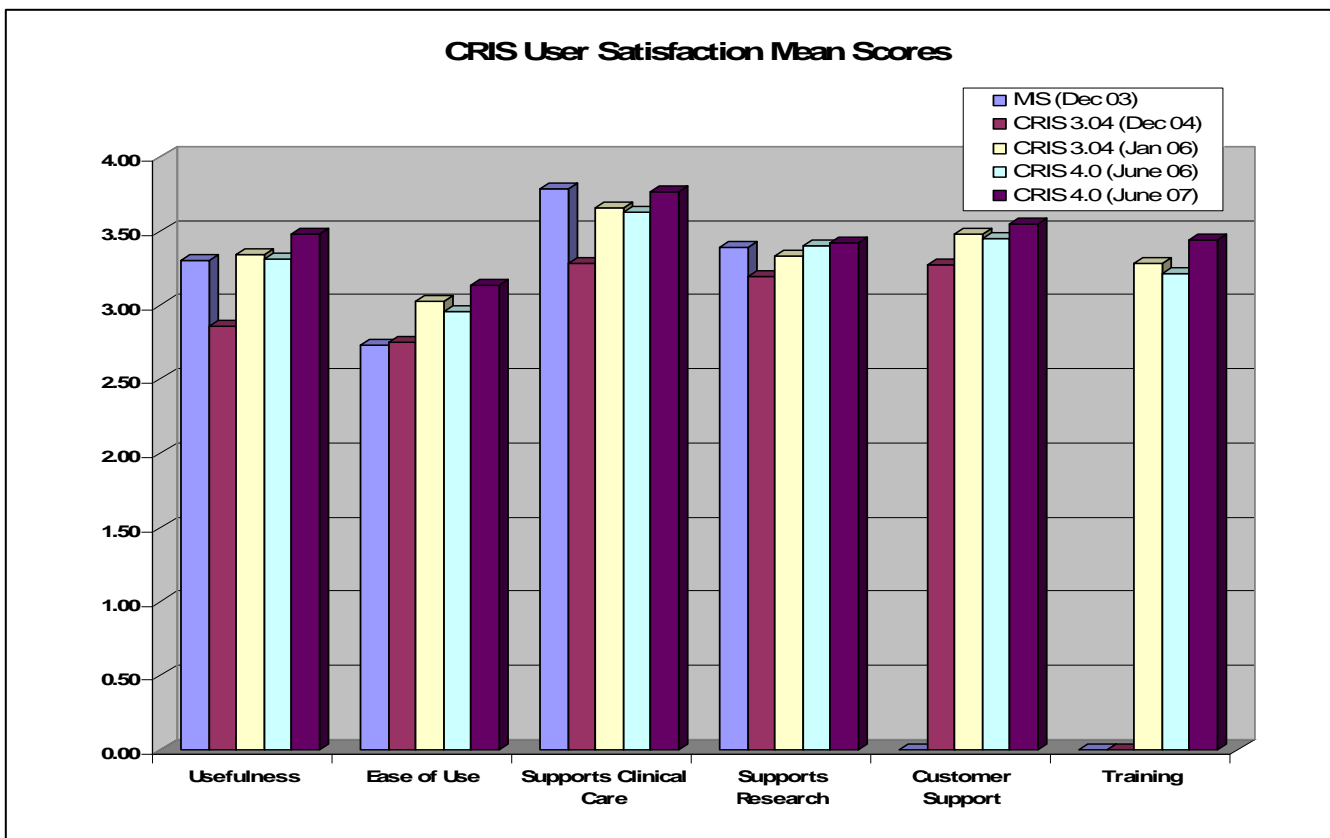
CRIS User Satisfaction Measurement

The questions for this survey illustrated in the bar chart below are based on a standardized instrument created by Fred Davis (1986) as a measure for the Technology Acceptance Model. A Likert-type scale was used where 1 is a low and 5 is a high level of satisfaction. Questions were asked related to:

- Perceived usefulness
- Perceived ease of use
- Level that system is felt to support clinical care
- Level that system is felt to support research
- Level of satisfaction with customer support
- Level of satisfaction with training

The survey results displayed represent the time period ranging before CRIS implementation in 2003 and span to June of 2007. Results of this survey as well as additional Performance Metrics monitored have helped to shape our plans to improve user satisfaction. Most importantly, we are encouraged by the fact that the current level of satisfaction for all users reflects a level that exceeds that obtained when MIS (system of 28 years) was in use.

CRIS User Satisfaction Mean Scores - All Users Over Time



Mean Scores	Scale 1-5						N
	Usefulness	Ease of Use	Supports Clinical Care	Supports Research	Customer Support	Training	
MIS (Dec 03)	3.30	2.73	3.78	3.39	N/A	N/A	444
CRIS 3.04 (Dec 04)	2.86	2.75	3.28	3.19	3.27	N/A	373
CRIS 3.04 (Jan 06)	3.34	3.02	3.66	3.33	3.48	3.28	331
CRIS 4.0 (June 06)	3.31	2.96	3.63	3.40	3.45	3.21	315
CRIS 4.0 (June 07)	3.48	3.13	3.76	3.42	3.55	3.44	305